

An update to the taxonomy of some Western Australian genera of Myrtaceae tribe Chamelaucieae. 4. *Malleostemon*

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Abstract

Rye, B.L. An update to the taxonomy of some Western Australian genera of Myrtaceae tribe Chamelaucieae. 4. *Malleostemon*. *Nuytsia* 27: 103–120 (2016). The following new species of *Malleostemon* J.W.Green are described: *M. costatus* Rye & Trudgen, *M. microphyllus* Rye & Trudgen, *M. nephroideus* Rye, *M. nerrenensis* Rye & Trudgen, *M. pentagonus* Rye & Trudgen, *M. pustulatus* Rye and *M. uniflorus* Rye. A new key is presented for the genus. *Malleostemon* sp. Kalbarri (L.A. Craven 7083) is reduced to synonymy under *M. hursthousei* (W.Fitzg.) J.W.Green and unnamed taxa that need further study are noted. Six of the new species have conservation priority.

Introduction

This paper on *Malleostemon* J.W.Green is the fourth in a series describing new species of Myrtaceae tribe Chamelaucieae DC. As explained in the first paper of the series (Rye 2013b), the aim is to name any clearly defined new species that are typical of the genus under study and have sufficient collections to allow a full description, while drawing attention to any taxa needing further investigation.

Malleostemon is a member of the *Hysterobaeckea* (Nied.) Rye group, with molecular data (e.g. Lam *et al.* 2002) suggesting that it is closely related to *Anticoryne* Turcz., *Babingtonia* Lindl., *Scholtzia* Schauer and *Tetrapora* Schauer (see Rye 2015: 221). It is endemic to Western Australia, extending from near Minilya Bridge in the Carnarvon area south-east to near Hyden and inland to Raeside Soak, south-east of Leonora. Many of the species overlap in range between Shark Bay and the goldfields and most occur in Kwongan.

Seven new species of *Malleostemon* are described here and a key is given to all 14 species that have been named for the genus to date. Methods are similar to those given in Rye (2013b).

Background

Not one of the species now placed in *Malleostemon* was included in the treatment of Myrtaceae in *Flora Australiensis* (Bentham 1867). It appears that James Drummond did not collect any material of this genus, which is concentrated inland or north of most of the early areas of settlement. The earliest specimen known for *Malleostemon*, from north of the Murchison River (MEL 76002), was collected by Ferdinand Mueller, who visited that region in October and November 1877 (George 2009).

The first four species of *Malleostemon* to be described (Fitzgerald 1904, 1905; Diels & Pritzel 1904) were placed under three different generic names, as *Baeckea decipiens* W.Fitzg., *Micromyrtus hursthousei* W.Fitzg., *Thryptomene rosea* E.Pritz. and *T. tuberculata* E.Pritz. One further species, *Micromyrtus peltigera* S.Moore, was added fifteen years later (Moore 1920).

When Green (1983) established *Malleostemon*, he based its name and delimitation on a stamen character, referring to the hammer-shaped stamens as geniculate. He considered the geniculate stamens, uni-loculate ovary and somewhat excentric style insertion as the primary characters in delimiting his new genus. Green recognised six species in the genus, including the four that had previously been described under the genera *Micromyrtus* Benth. and *Thryptomene* Endl. He was unaware that *Baeckea decipiens* also matched his new genus. A new combination in *Malleostemon* has recently been made for that species (Rye & Trudgen 2012).

Eighteen phrase names (see Table 1) are listed for the genus *Malleostemon* in *FloraBase* (Western Australian Herbarium 1998–). Fifteen of these were established during the 1990s by Malcolm Trudgen, who applied this generic name loosely to taxa that had a uni-locular, indehiscent fruit and a variety of derived anther types, even including one species that did not have geniculate stamens. The non-geniculate species is now known as *Aluta teres* Rye & Trudgen (Rye & Trudgen 2000).

One further phrase name was added by Trudgen in 2002. The current study of *Malleostemon* commenced in the same year and led to the establishment of two further phrase names; all three of these more recent names apply to typical members of the genus.

One of the previously established, phrase-named taxa that does not belong to *Malleostemon* has recently been named *Babingtonia delicata* Rye & Trudgen (Rye 2015).

Chromosome numbers

Chromosome number determinations were published (Rye 1979) for four diverse species now recognised as belonging to the genus *Malleostemon*. Three species had the tetraploid number of 22 chromosomes (*M. hursthousei* (W.Fitzg.) J.W.Green, *M. roseus* (E.Pritz.) J.W.Green and *M. tuberculatus* (E.Pritz.) J.W.Green) and only one (*M. nephroideus* Rye) was diploid with 11 chromosomes. The three polyploid species of *Malleostemon* are relatively widespread, successful taxa, whereas the diploid species is geographically restricted. Polyploidy is usually much less common than diploidy in genera of the tribe Chamelaucieae, a notable exception being *Ericomyrtus* Turcz. (Rye 2015).

Need for further work

Only six of the 18 phrase names for *Malleostemon* are still current (Table 1). Two of the very poorly known taxa that have been retained under phrase names for now are closely related to *M. nephroideus* (see notes under that species), while another two, *M. sp.* Woolgorong Station (M. Officer 100) and *M. sp.* Yalgoo Road (Morawa Tree Committee 329), are similar to *M. tuberculatus*. These taxa might prove to be hybrids or to be insufficiently distinct to warrant formal recognition.

Two inland species that are noted in Table 1 as atypical of *Malleostemon* have been retained under their current informal names as further research is needed to determine where their affinities lie. *Malleostemon* sp. Adelong (G.J. Keighery 11825) is known from four collections; it is distinguished from other species currently placed in *Malleostemon* by its globular anthers with no obvious protrusion of the connective gland. *Malleostemon* sp. Officer Basin (D. Pearson 350) has enough collections to

Table 1. Phrase names in *Malleostemon*, with the year they were added to the census, their current names (including those published here) and comments.

Informal name in <i>Malleostemon</i>	Year	Current name or comment
<i>M. sp.</i> Adelong (G.J. Keighery 11825)	1995	poorly known, generic placement uncertain
<i>M. sp.</i> Ajana (M.E. Trudgen 21715)	2012	<i>Malleostemon uniflorus</i> Rye
<i>M. sp.</i> Bulga Downs (S. van Vreeswyk 3138)	1996	<i>Aluta teres</i> Rye & Trudgen
<i>M. sp.</i> Cooljarloo (B. Backhouse s.n. 16/11/1988)	1994	<i>Babingtonia delicata</i> Rye & Trudgen
<i>M. sp.</i> Cooloomia (S.D. Hopper 1353)	1994	<i>Malleostemon microphyllus</i> Rye & Trudgen
<i>M. sp.</i> Erangy Springs (M.E. Trudgen 12030)	1994	<i>Malleostemon nephroideus</i> Rye
<i>M. sp.</i> Hardabutt Rapids (D. Bellairs 1654A)	1995	<i>Malleostemon pentagonus</i> Rye & Trudgen
<i>M. sp.</i> Junga Dam (D. Bellairs 942)	2005	<i>Malleostemon pustulatus</i> Rye
<i>M. sp.</i> Kalbarri (L.A. Craven 7083)	1994	<i>Malleostemon hursthousei</i> (W.Fitzg.) J.W.Green
<i>M. sp.</i> Moonyoonooka (R.J. Cranfield 2947)	1994	poorly known, similar to <i>M. nephroideus</i>
<i>M. sp.</i> Mullewa (P. Winson B7365)	1995	<i>Malleostemon nephroideus</i> Rye
<i>M. sp.</i> Officer Basin (D. Pearson 350)	1994	poorly known, generic placement uncertain
<i>M. sp.</i> Nerren Nerren (A. Payne 360)	1994	<i>Malleostemon nerrenensis</i> Rye & Trudgen
<i>M. sp.</i> Unmade Road (E.A. Griffin 7537)	1994	<i>Scholtzia sp.</i> Geraldton (F. Lullfitz 3216)
<i>M. sp.</i> Woodacurrie Rd (S. Patrick 3364)	2002	poorly known, similar to <i>M. nephroideus</i>
<i>M. sp.</i> Woolgorong Station (M. Officer 100)	1996	poorly known, similar to <i>M. tuberculatus</i>
<i>M. sp.</i> Yalgoo Road (Morawa Tree Committee 329)	1996	poorly known, similar to <i>M. tuberculatus</i>
<i>M. sp.</i> Yerina (S.J. Patrick 2728)	1997	<i>Malleostemon costatus</i> Rye & Trudgen

give a good indication of its distribution, but unfortunately most are sterile, the remainder just with a few buds. Good flowering and fruiting material is difficult to obtain owing to the inaccessibility of this species in the arid zone.

One further atypical species, *M. sp.* Unmade Road (E.A. Griffin 7537), is currently known by its synonym *Scholtzia sp.* Geraldton (F. Lullfitz 3216) because more specimens were housed under the latter name at the time the duplicity of phrase names was noticed in 2003. It differs from *Scholtzia* in having four to eight radially arranged ovules in a single loculus, rather than one or two superposed ovules in usually two or three loculi per flower, and differs from both genera in having faceted chaff pieces and a thinly crustaceous testa on the solitary seed.

Generic characters

Malleostemon species are glabrous shrubs, varying from almost prostrate to about 3 m high. All of them have opposite, decussate leaves and axillary, 1–3(–7)-flowered peduncles. Their flowers have five spreading petals, three to 13 geniculate stamens and an inferior, 1-locular ovary with three to nine ovules. The anthers are dehiscent by two pores or very short slits. The large connective gland is more or less horizontal and at right angles to the terete filament below, with the anther loculi connected to it at the other end facing towards the centre of the flower. The slender style has a small, capitate stigma. The fruit is inferior and indehiscent; its solitary seed is 0.6–2 mm long and has a thin, membranous testa. Detailed illustrations of the morphology of *Malleostemon* can be found in Green (1983).

Stamen arrangement is variable in the genus. When there are three to five stamens per flower, then either all or none of them are antipetalous, depending on the species. Where stamen number exceeds

the number of petals, the stamens directly opposite or closest to the centre of a petal are larger than those opposite the sepals, sometimes a great deal larger, and occasionally one of the antisepalous stamens is reduced to a staminode.

In most myrtaceous genera that have a uni-locular ovary, the style is fully terminal (i.e. with the base not inset) and inserted at the centre of the ovary summit. However in *Malleostemon*, the style is usually somewhat to markedly excentric (see Green 1983: Figure 14), a feature that may be most obvious in the fruiting stage, with the base slightly or distinctly inset into the summit of the ovary towards one side of the flower. This suggests that the uni-locular ovary of *Malleostemon* has been derived from a bi-locular ovary, probably by abortion of the adaxial loculus judging from the more or less sessile flowers of *M. microphyllus* Rye & Trudgen. This is similar to several uni-locular species in the primarily multi-locular genera *Astartea* DC. (Rye 2013a: 197) and *Babingtonia* (Rye 2015), although the orientation of the ovary is unclear in some species because the flowers are relatively long-stalked. Green (1983) suggested that further evidence for the recent evolution of the uni-locular ovary is the rare occurrence of bi-locular ovaries in normally uni-locular species. An example recorded in the current study was a bi-locular ovary, with six ovules in one loculus and seven in the other loculus, on the *C.A. Howard & T.F. Houston* 338-7 specimen of *M. minilyaensis* J.W.Green. In this case the style is central rather than excentric.

Another odd aspect of the morphology of *Malleostemon* is the occurrence within the genus of uni-locular anthers, which Green (1983: Figures 74–80) reported in *M. roseus*, although the other species named at that time all had bi-locular anthers.

Any of the characters described above that are universal in *Malleostemon* are not repeated in the species descriptions below.

Key to the named species of *Malleostemon*

Note for use of key: several flowers should be checked for stamen number and arrangement to give the best chance of choosing correctly between the choices for the first couplet; occasionally the arrangement looks somewhat irregular in some flowers.

1. Stamens 4–13, solitary or in small groups opposite all or most of the sepals, no antipetalous stamens present. Petals 0.7–2.5 mm long
2. Tall shrubs up to c. 3 m high, usually associated with granite outcrops and in other rocky habitats. Leaves with an apical point 0.5–1.2 mm long. Petals persistent and spreading in fruit. Ovules 6–8 per loculus (near Kalbarri–Leonora area–near Hyden)..... **M. tuberculatus**
- 2: Almost prostrate to 1.5 m high shrubs, occurring on sandplains, low-lying habitats or breakaways. Leaves not pointed or with an apical point up to 0.3 mm long. Petals deciduous. Ovules 4–6 per loculus
3. Hypanthium with a broad, truncate base. Stamens 7–13, variable on each plant. Ovules 4. Seed transversely reniform, i.e. broader than long (near Mullewa)..... **M. nephroideus**
- 3: Hypanthium tapering at base. Stamens 5. Ovules 3–8 per loculus, not constant in any species. Seed ± obovoid, longer than broad.
4. Leaves not clustered. Bracteoles 0.4–0.6 mm long, caducous or deciduous. Sepals 0.3–0.5 mm long. Petals 1.2–1.5 mm long (Kalbarri NP)..... **M. pustulatus**

- 4: Leaves densely clustered. Bracteoles 0.7–1.8 mm long, persistent. Sepals 0.5–0.8 mm long. Petals 1.5–2.5 mm long (near Mingenew)..... **M. decipiens**
- 1: Stamens 3–10, ± equidistant, with antipetalous stamens always present. Petals 1.3–4 mm long
- 5: Leaves peltate, herbaceous throughout. Peduncles 1-flowered. Mature style 1.3–2.2 mm long, inserted in a distinctly raised area at centre of ovary summit (Shark Bay–Mullewa)..... **M. peltiger**
- 5: Leaves not peltate, with a scarious margin. Peduncles 1–3-flowered. Mature style 0.4–1.6 mm long, not in a raised central area of ovary summit
- 6: Bracteoles with broad, deeply denticulate to laciniate margins. Stamens 3–5. Mature style 0.4–0.8 mm long
- 7: Hypanthium 1.7–2 mm long, well exposed (Nerren Nerren Stn)..... **M. nerrenensis**
- 7: Hypanthium 1–1.5 mm long, largely hidden by bracts
- 8: Leaf blades 0.9–1.5 mm long. Sepals strongly incurved in flower and fruit (Cooloomia NR–Murchison House Stn)..... **M. microphyllus**
- 8: Leaf blades 1.3–2.3 mm long. Sepals erect to widely spreading in flower and fruit (Murchison House Stn–Nerren Nerren Stn–Watheroo) **M. hursthousei**
- 6: Bracteoles entire or denticulate. Stamens 5–10. Mature style 0.6–1.6 mm long
- 9: Leaves very broadly obovate or depressed-obovate, mostly broader than long or *c.* as broad as long. Peduncles apparently absent, each axil 1-flowered
- 10: Bracteoles 1.2–2(–2.2) mm long. Ovules 6–9, mostly 7 or 8 (Minilya Bridge area–Kennedy Ra.–Talisker Stn)..... **M. minilyaensis**
- 10: Bracteoles 2.5–3.5 mm long. Ovules 4–6, mostly 5 or 6 (Nerren Nerren Stn–Mullewa) **M. uniflorus**
- 9: Leaves oblong to broadly obovate, longer than broad. Peduncles usually 0.4–4 mm long, rarely apparently absent, 1–3-flowered
- 11: Bracteoles deciduous. Flowers distinctly stalked, with a peduncle 1–4 mm long and pedicel 0.5–1 mm long (Hamelin Pool area) **M. pedunculatus**
- 11: Bracteoles persistent. Flowers shortly to distinctly stalked, with a peduncle 0–2(–3) mm long and pedicel 0–0.5 mm long
- 12: Hypanthium terete, with obvious antisepalous ribs and often also smaller antipetalous ones (Kalbarri NP–near Binnu)..... **M. costatus**
- 12: Hypanthium obviously 5-angled in flower or becoming so in fruit, with narrow antisepalous ribs, wrinkled to smooth between the ribs
- 13: Leaves obovate or broadly obovate, somewhat keeled. Peduncles up to 0.6 mm long when 1-flowered, up to 1.5 mm long when 3-flowered (near Nerren Nerren Stn–near Greenough River) **M. pentagonus**
- 13: Leaves oblong or obovate, not keeled. Peduncles at least 0.7 mm long when 1-flowered, up to 3 mm long when 3-flowered (Hamelin Pool–Kalgoorlie)..... **M. roseus**

Review of previously named species

The delimitations of both of the species named by Green (1983), *M. minilyaensis* and *M. pedunculatus* J.W.Green, are reduced by the recognition of new species. Alterations needed to the published records to bring them up to date with these changes are listed below under the new species *M. costatus* Rye & Trudgen and *M. uniflorus* Rye. Green's descriptions of the four previously named species are unaffected by the recognition of additional species in this paper.

Malleostemon sp. Kalbarri (L.A. Craven 7083) is here reduced to synonymy under *M. hursthousei*.

Description of new species

***Malleostemon costatus* Rye & Trudgen, sp. nov.**

Typus: north of Northampton, Western Australia [precise locality withheld for conservation reasons], 23 September 2002, *M.E. Trudgen* 21672 (*holo*: PERTH 06360688; *iso*: CANB, K, MEL, NSW).

Malleostemon sp. Yerina (S.J. Patrick 2728), G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 391 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Shrub 0.5–2 m high, 0.5–2.5 m wide; flowering branchlets with 2–6 pairs of peduncles. *Young stems* 4-angled on rapidly growing shoots. *Leaves* antrorse or spreading, usually rather crowded on the branchlets. *Foliar collectors* up to 0.2 mm long. *Petioles* well defined, 0.3–0.5 mm long. *Leaf blades* obovate or broadly obovate, 1.7–3 mm long, 1.2–2 mm wide, entire or minutely denticulate, with 1 main row of 4–6 oil glands on each side of the broad, flattened keel, the abaxial surface recurved; apical point absent. *Peduncles* 1.2–2 mm long, 1–3-flowered but most commonly 1-flowered; secondary axes 0–0.5 mm long. *Bracteoles* persistent, 1.5–2.3 mm long, largely herbaceous, ± entire. *Pedicels* 0–0.5 mm long. *Flowers* 4–5 mm diam. *Hypanthium* with 5, fairly broad antisepalous ribs and sometimes 5 narrower antipetalous ribs, 1.3–2(–2.5) mm long; free portion c. 0.3 mm long. *Sepals* 0.6–1.1 mm long, strongly ridged, ± entire. *Petals* 2–2.5 mm long, pale to medium pink. *Stamens* 10, opposite the sepals and petals. *Antipetalous filaments* 0.6–0.7 mm long. *Anthers* (including gland) 0.3–0.4 mm long; connective gland 0.25–0.3 mm long. *Ovary* with a pink to dark red summit; ovules 5–8. *Style* 0.75–1.5 mm long. *Fruits* 1.3–1.5 mm long (excluding free hypanthium and sepals), 1.2–1.3 mm diam.; seed irregularly broadly obovoid, with side adjacent to placenta flattened, c. 1 mm long, c. 0.8 mm wide, testa pale brown, hilum c. 0.1 mm diam.

Diagnostic features. Distinguished by the following combination of characters: 1–3-flowered peduncles 1.2–2 mm long, persistent, ± entire bracteoles 1.5–2.3 mm long, terete hypanthium with obvious antisepalous ribs, 10 stamens, which are antipetalous and antisepalous, 5–8 ovules and style 0.75–1.5 mm long.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 2 Oct. 2007, *A. Crawford* 1380 (PERTH); 3 Sep. 1963, *A.R. Fairall* 1206 (PERTH); 21 Aug. 1961, *C.A. Gardner* 13264 (PERTH); 30 Sep. 2003, *R. Meissner* NA_RM 4 (PERTH); 24 Sep. 2002, *M.E. Trudgen* 21690 (AD, BRI, PERTH).

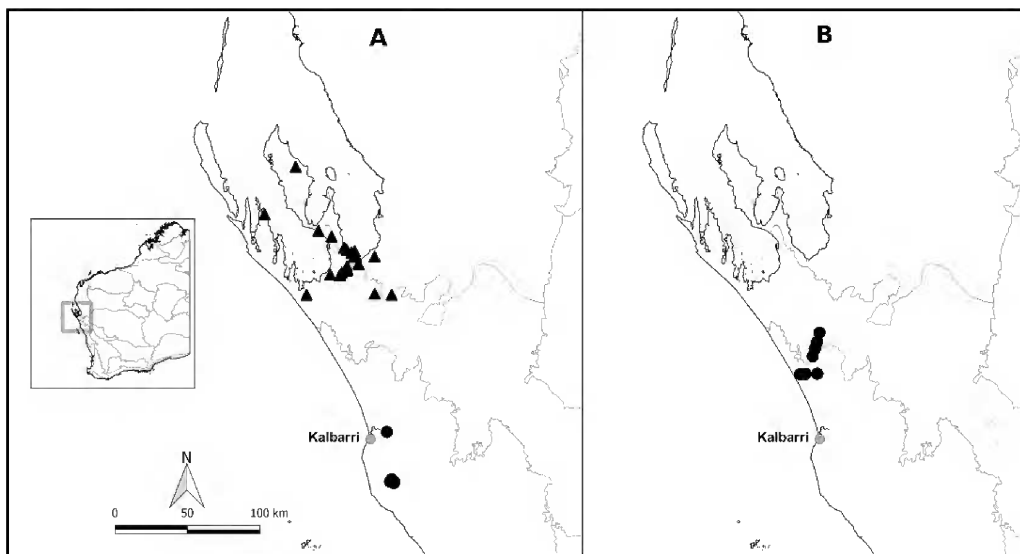


Figure 1. Distribution maps. A – *Malleostemon costatus* (●) and *M. pedunculatus* (▲); B – *M. microphyllus* (●).

Distribution and habitat. Extends from Kalbarri National Park south to near Binnu (Figure 1A), usually on sandy soils.

Phenology. Flowers August to October. Fruits recorded from late September to November.

Conservation status. Previously listed by Jones (2015) as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora as *M. sp. Yerina* (S.J. Patrick 2728). It was recently downgraded to Priority Two. This species is known from Kalbarri National Park and Yerina Springs Nature Reserve. It is a very attractive shrub in cultivation.

Etymology. The epithet is Latin for ribbed and refers to the rather prominent ribs on the hypanthium.

Affinities. Similar to *M. pedunculatus* but differing in its persistent bracteoles, its usually shorter peduncles and its very short or absent pedicels. *Malleostemon costatus* occurs further south than *M. pedunculatus*.

Co-occurring species. This species occurs closer to the coast than most species of *Malleostemon* within the Kalbarri–Binnu area and has not been recorded growing with any of them.

Notes. Three specimens of the new species, *A.R. Fairall* 1206 and *C.A Gardner* 13263 and 13264, were identified in 1982 by Green as *M. pedunculatus* and the Fairall specimen was cited in Green (1983), although the description did not include the distinguishing features of these specimens. Green (1983: 303) did note that there was ‘an outlying occurrence near Kalbarri’ but this outlier was omitted from the distribution map (Green 1983: Map 1, closed triangles on p. 312), which matches the current distribution for *M. pedunculatus*. Note that the two distribution maps presented on page 312 are reversed in position relative to the captions given, so that Map 2 should have been the one to show the range of *M. pedunculatus*.

Malleostemon microphyllus Rye & Trudgen, *sp. nov.*

Typus: near Zuytdorp Cliffs, Western Australia [precise locality withheld for conservation reasons], 26 August 1994, *G.J. Keighery & N. Gibson* 510 (*holo*: PERTH 04091558; *iso*: CANB, K, MEL).

Malleostemon sp. Cooloomia (S.D. Hopper 1353), G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 390 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Shrub commonly 0.7–1.5 m high, up to at least 1.5 m wide; flowering branchlets with up to *c.* 15 (usually 5–8) pairs of flowers/peduncles. *Young stems* nearly always hidden on the youngest branchlets by a continuous cover of overlapping leaves. *Leaves* antrorse or appressed, not clustered, with adjacent pairs overlapping at first, becoming separated as stems elongate but soon shed, the subtending leaves of the branchlets or of galls with an oblong or narrowly oblong blade up to 3 mm long. *Foliar colleters* apparently absent. *Petioles* absent or up to 0.1 mm long. *Leaf blades* (of the branchlets, excluding subtending leaves) obovate or broadly obovate, 0.9–1.5 mm long, 0.7–1.1 mm wide, concavo-convex, the abaxial surface with a row of 3–5 large oil glands on each side of midvein and a second row of a few smaller oil glands closer to the margin, the concave abaxial surface with no obvious oil glands; scarious margin up to *c.* 0.1 mm wide, entire or denticulate; apical point absent. *Peduncles* 0–0.2 mm long, 1(2)-flowered; secondary axes \pm absent. *Bracteoles* persistent, 1.2–1.5 mm long; keel prominent and narrow (almost winged), brown and/or green; scarious margins broad, whitish, entire to deeply denticulate. *Pedicels* \pm absent. *Flowers* 3–4 mm diam. *Hypanthium* 5-ribbed, 1–1.5 mm long, 1.3–1.5 mm wide; free portion up to 0.3 mm long. *Sepals* strongly incurved, 0.4–0.5 mm long, green or red-tinged; scarious margin narrow, white. *Petals* 1.3–1.7 mm long, white to medium pink. *Stamens* 3–5, \pm antipetalous. *Filaments* 0.3–0.5 mm long. *Anthers* (including gland) 0.2–0.3 mm long; connective gland 0.1–0.2 mm long. *Ovules* 3–5. *Style* 0.5–0.8 mm long. *Fruits* *c.* 1.3 mm long, *c.* 1 mm diam.; seed (not fully mature) ellipsoid-obovoid, up to *c.* 1 mm long, *c.* 0.6 mm diam.

Diagnostic features. Distinguished from most species by having bracteoles with denticulate-laciniate margins and 3–5, \pm antipetalous stamens. Other important characters are its small leaves 0.9–1.5 mm long, strongly incurved sepals, 3–5 ovules and style 0.5–0.8 mm long.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 18 Sep. 1979, *S.D. Hopper* 1353 (PERTH); 26 Aug. 1994, *G.J. Keighery & N. Gibson* 511 (AD, NSW, PERTH); 28 Aug. 1991, *G.J. Keighery & N. Gibson* 973 (PERTH).

Distribution and habitat. Extends from Cooloomia Nature Reserve to Murchison House Station (Figure 1B), in yellow to red sand over limestone, on dunes or in swales.

Phenology. Flowers from August to September. Almost mature fruits recorded in September.

Conservation status. Listed by Jones (2015) as Priority Two under Department of Parks and Wildlife Conservation Codes for Western Australian Flora as *M. sp.* Cooloomia (S.D. Hopper 1353).

Etymology. From the Greek *micro-* (small-) and *phyllus* (-leaved), as this species has the smallest leaves in the genus.

Affinities. Similar to *M. hursthousei* in its low stamen number but with usually shorter leaves and with strongly incurved sepals that remain so in fruit. It is more similar to *M. nerrenensis* Rye & Trudgen in leaf size but differs from that species in its shorter hypanthium and shorter bracteoles.

Co-occurring species. Not recorded growing with any other species of *Malleostemon*.

Notes. Two kinds of stem galls have been observed on this species. One kind is narrowly ovoid and is subtended by abnormal, elongated leaves up to 3 mm long, which may remain after the gall has been replaced by a leafy shoot. The other kind of gall is broader and is subtended by leaves of a normal size and shape.

As the flowers of *M. microphyllus* are almost sessile, their orientation with respect to the stem is obvious. The clear excentricity of the style means that the flowers are somewhat zygomorphic. They are orientated such that one of the five sepals is adaxial and one of the five petals is abaxial. This is similar to the situation in *Corynanthera* J.W.Green and some species of *Micromyrtus* (Rye 2006: Figure 1), while the opposite orientation of flowers (i.e. with an abaxial sepal and adaxial petal) is seen in *Astartea arbuscula* (Benth.) Rye (Rye 2013a: 197).

***Malleostemon nephroideus* Rye, sp. nov.**

Typus: south-west of Mullewa, Western Australia [precise locality withheld for conservation reasons], 24 October 2001, S. Patrick 4071 (*holo:* PERTH 06281389; *iso:* K, MEL).

Malleostemon sp. Erangy Springs (M.E. Trudgen 12030), G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 390 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Malleostemon sp. Mullewa (P. Winson B7365), G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 391 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Low, widely spreading *shrub* 0.2–0.6 m high, 1–1.5 m wide; flowering branchlets with up to 10 (usually 2–7) pairs of peduncles. *Young stems* without obvious glands. *Leaves* antrorse or appressed. *Foliar collectors* up to 0.2 mm long. *Petioles* absent or up to 0.2 mm long. *Leaf blades* ± oblong or narrowly oblong in outline, 1.2–2.2(–3.5) mm long, 0.4–1.3 mm wide, 0.3–0.5 mm thick, tending to have prominent oil glands, with 3–6 large or moderate-sized glands in a row on each side of the midvein, often also with smaller glands in a second row closer to the margin, margins entire; apical point 0–0.2 mm long. *Peduncles* 1–4 mm long, 1–3-flowered, usually 1-flowered; secondary axes 0.4–0.8 mm long. *Bracteoles* deciduous or persistent, 0.7–1.5 mm long, ± entire. *Pedicels* ± absent. *Flowers* 3–5 mm diam. *Hypanthium* 0.7–1.3 mm long, with 5 widely spaced, often irregular antisepalous ribs, rugose in between and often with very prominent oil glands; free portion 0.3–0.4 mm long. *Sepals* 0.4–0.8 mm long, with broad hyaline margins, erect or spreading in fruit. *Petals* 1.5–2 mm long, pale to medium pink. *Stamens* 7–13, with 1–4 opposite each sepal. *Longest filaments* 0.3–0.6 mm long. *Anthers* (including gland) 0.3–0.35 mm long; connective gland 0.15–0.2 mm long. *Ovary* broad, with the summit becoming reddish; ovules 4. *Style* 0.3–0.4 mm long. *Fruits* 1.1–1.4 mm long, 1.2–1.4 mm wide, irregularly lobed or coarsely rugose, with sepals somewhat to widely spreading; seed transversely reniform, 0.8–1.1 mm long, c. 0.6 mm wide, c. 0.6 mm deep, testa pale brown, hilum 0.15–0.2 mm diam.

Diagnostic features. Distinguished primarily by the broad, truncate base of its hypanthium, constant ovule number of 4, and depressed fruit with a \pm transversely reniform seed. Other important characters are its 1–3-flowered peduncles 1–4 mm long, and its 7–13 stamens in antisepalous groups.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 7 Nov. 1999, *J. Docherty* 15 (PERTH); 24 Oct. 2001, *S.J. Patrick* 4071 (PERTH); 2 Dec. 1999, *L. Polomka & S.J. Patrick* 3365 (AD, BRI, PERTH); 6 Dec. 1993, *M.E. Trudgen* 12030 & *M.R. Trudgen* (CANB, K, MEL, NSW, PERTH).

Distribution and habitat. Occurs near Mullewa (Figure 2A), in yellow or orange sand in the swales between dunes.

Phenology. Flowers from October to December. Fruits recorded late November to December.

Conservation status. Previously listed by Jones (2015) as Priority Three and Priority One under the Department of Parks and Wildlife Conservation Codes for Western Australian Flora as *M. sp.* Erangy Springs (M.E. Trudgen 12030) and *M. sp.* Mullewa (P. Winson B7365) respectively. To be listed as Priority Three when *M. nephroideus* has been added to the Western Australian plant census.

Etymology. This epithet is Greek and means kidney-shaped, referring to the shape of the seeds.

Chromosome number. $n = 11$, *vide* B.L. Rye, *Austral. J. Bot.* 27: 570 (1979) [as *Micromyrtus rosea*].

Affinities. Similar to *M. peltiger* (S.Moore) J.W.Green in having a transversely reniform seed, but differing in many respects from that species (e.g. in stamen arrangement) and probably not closely related. Among the named species with all stamens antisepalous, *M. nephroideus* is the only one to have a transversely reniform seed, and the only one to have stamen numbers varying between flowers but a fixed ovule number of four; other taxa have a constant stamen number of five per flower but ovule numbers varying between flowers. A transversely reniform seed occurs in a number of species of other genera of Chamelaucieae, such as *Aluta* Rye & Trudgen and *Thryptomene*, where the seed is horizontal in a depressed fruit, since it fits the available space for the loculus in such a fruit. Most species of *Malleostemon* have an erect seed in a more elongated fruit.

Co-occurring species. No other species of *Malleostemon* have been recorded growing with *M. nephroideus* although the species occurs within the ranges of a number of other species, including *M. hursthousei*, *M. roseus* and *M. tuberculatus*.

Notes. This new species was apparently the only unnamed taxon Green (1983) specifically excluded from his descriptions. In 1982, Green had labelled one specimen, *F. Lullfitz* L3215, of *M. nephroideus* as a possible hybrid between *M. roseus* and *M. hursthousei*. He suggested that hybrids between those two species could be the basis of a ‘variant from the Murchison River area, having long peduncles, broad leaf bases, leaves with apiculate tips and a glandular tuberculate floral tube’ (Green 1983: 308). That description is evidently the first that applies to the new taxon, although the Lullfitz specimen is from Mullewa, which is over 100 km from the Murchison River.

In 1995, Trudgen applied the phrase name *M. sp.* Mullewa (P. Winson B7365) to the *F. Lullfitz* L3215 specimen Green had previously drawn attention to, but gave no indication of how this taxon could be distinguished. Previously, in 1994, he had established two other phrase names for this species group,

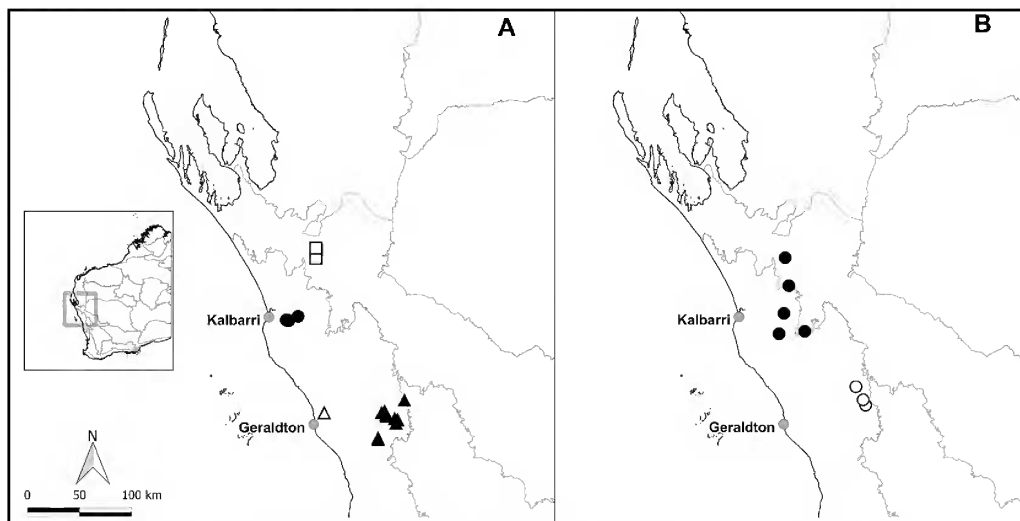


Figure 2. Distribution maps. A – *Malleostemon nephroideus* (▲), *M. nerrenensis* (□), *M. pustulatus* (●) and *M. sp. Moonyoonooka* (R.J. Cranfield 2947) (△); B – *M. pentagonus* (●) and *M. aff. pentagonus* (○).

with a note dated 24/2/1994 on a folder of *M. sp. Moonyoonooka* (R.J. Cranfield 2947) stating ‘seems closest to *Malleostemon roseus*’ and a note dated 17/11/1994 on a folder of *M. sp. Erangy Springs* stating ‘This species is very similar superficially to *Malleostemon sp. Moonyoonooka* (R.J. Cranfield 2947) but is quite distinct’, listing differences in the hypanthium and sepals that do not stand up to scrutiny. However, *M. sp. Moonyoonooka* does occur further west and has fewer stamens (5–7 rather than (7–)9–13 per flower), suggesting that it may warrant recognition as a distinct subspecies. As *M. sp. Moonyoonooka* is only known from two specimens collected on the same day from the same locality, more material is needed to determine whether the difference in stamen number is significant.

Similarly known from a single locality, this time from only one specimen, is *M. sp. Woodacurrie Rd* (S. Patrick 3364), which was established by Trudgen in 2002. It has less thickened leaves on the youngest stems and has relatively few stamens (7 or 8). This will be retained for now under its phrase name but may just be a variant of *M. nephroideus* or of hybrid origin.

Malleostemon nerrenensis* Rye & Trudgen, *sp. nov.

Typus: south of Billabong Roadhouse, Western Australia [precise locality withheld for conservation reasons], 10 October 1994, *M.E. Trudgen* 12104 (*holo*: PERTH 08208425; *iso*: CANB, K, MEL).

Malleostemon sp. Nerren Nerren (A. Payne 360), G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 390 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Shrub commonly 1–1.6 m high, up to at least 2 m wide; flowering branchlets with usually 1–6 pairs of peduncles, the flowers forming a dense cluster. *Young stems* nearly always hidden on the youngest branchlets by a continuous cover of overlapping leaves. *Leaves* antrorse or appressed, not clustered, with adjacent pairs overlapping at first, becoming separated as stems elongate but soon shed, the subtending leaves of the branchlets or of galls with an oblong or narrowly oblong blade up to 3 mm

long. *Foliar colleters* apparently absent. *Petioles* absent or up to 0.2 mm long. *Leaf blades* mostly \pm broadly obovate, 1–1.7 mm long, 0.8–1.1 mm wide, concavo-convex, the abaxial surface with a row of 3–6 large oil glands on each side of midvein and often a second row of a few smaller oil glands closer to the margin, the concave abaxial surface with no obvious oil glands; scarious margin entire or minutely ciliate; apical point absent. *Older or subtending leaf blades* (when present) \pm obovate and up to 2 mm long. *Peduncles* 0.1–0.5 mm long, 1–3-flowered, commonly 3-flowered; secondary axes \pm absent. *Bracts and bracteoles* persistent, the longest ones 2–2.2 mm long, with shorter ones present only if there are multiple flowers per peduncle; keel prominent and narrow (almost winged), brown and/or green; scarious margins broad, whitish, deeply denticulate or lacinate. *Pedicels* \pm absent. *Flowers* 4–5 mm diam. *Hypanthium* 5-ribbed, 1.7–2 mm long, with large oil glands; free portion up to 0.2 mm long. *Sepals* fairly erect, 0.5–0.7 mm long, green or red-tinged; scarious margin narrow, white. *Petals* 1.7–2.2 mm long, white or pale pink. *Stamens* 4 or 5, \pm antipetalous. *Filaments* c. 0.35 mm long. *Anthers* (including gland) c. 0.25 mm long; connective gland c. 0.15 mm long. *Ovules* 4–6. *Style* 0.5–0.7 mm long. *Fruits* not seen at maturity.

Diagnostic features. Distinguished from most species by having bracteoles with denticulate-lacinate margins and 4 or 5 \pm antipetalous stamens. Other important characters are its small leaves 1–1.7 mm long, exposed hypanthium 1.7–2 mm long, 4–6 ovules and style 0.5–0.7 mm long.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] Sep. 1982, *A. Payne* 360 (CANB *n.v.*, PERTH); 25 Sep. 2002, *M.E. Trudgen* 21716 (PERTH); 25 Sep. 2002, *M.E. Trudgen* 21717 (AD, BRI, NSW, MEL, PERTH); 26 Sep. 2002, *M.E. Trudgen* 21722 (PERTH); 26 Sep. 2002, *M.E. Trudgen* 21724 (PERTH).

Distribution and habitat. Restricted to the Nerren Nerren Station area (Figure 2A), recorded on the mid- to lower slopes of sand dunes.

Phenology. Flowers from August to September.

Conservation status. Listed by Jones (2015) as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora as *M. sp.* Nerren Nerren (*A. Payne* 360). Only three localities are known, all very close together.

Etymology. Named after its area of occurrence on Nerren Nerren Station.

Affinities. Very similar to *M. hursthousei*, from which it differs in its longer hypanthium and usually smaller leaves, and to *M. microphyllus* (see notes under that species).

Co-occurring species. This species has been recorded growing with *M. peltiger* at one locality and with both *M. peltiger* and *M. roseus* at another locality.

Notes. As in *M. microphyllus*, this species has abnormal, elongated leaves up to c. 3 mm long associated with a kind of gall. The first collection of *M. nerrenensis*, made in 1982, was initially identified as *Micromyrtus aff. hursthousei* and later used as the basis of the phrase name *M. sp.* Nerren Nerren (*A. Payne* 360). It was apparently not available in time to be cited by Green (1983).

Malleostemon pentagonus Rye & Trudgen, *sp. nov.*

Typus: North West Coastal Highway, Western Australia [precise locality withheld for conservation reasons], 24 September 1976, *G. Perry* 586 (*holo*: PERTH 01945475; *iso*: CANB, K, MEL).

Malleostemon sp. Hardabutt Rapids (D. Bellairs 1654A), G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 390 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Shrub 0.7–2.1 m high, up to at least 2 m wide; flowering branchlets with 1–6 (usually only 1 or 2) pairs of peduncles. *Young stems* with obvious glands at first when rapidly growing, soon becoming 4-ridged and smooth-surfaced (rather than glandular), the ridges extending for 2 internodes below each leaf but often becoming narrow at the base of the first internode where they pass between the next pair of leaves. *Leaves* antrorse, the pairs sometimes separated by long internodes. *Foliar colleters* up to 0.2 mm long. *Petioles* well or poorly defined, commonly 0.2–0.3 mm long but sometimes appearing to be absent. *Leaf blades* obovate or broadly obovate in outline, 1.5–2 mm long, 1–1.3 mm wide, 0.5–0.7 mm thick; abaxial surface flattened and \pm level on the keel and with each side sloping and becoming less thick towards the margin; margins entire, with 1 row of 3–5 large oil glands on each side of the keel and a second row closer to the margin with smaller oil glands; apical point \pm absent. *Peduncles* usually 0.4–1.5 mm long, 1–3-flowered; secondary axes \pm absent. *Bracteoles* persistent, 1.7–2.5 mm long; scarious margin \pm entire. *Pedicels* \pm absent. *Flowers* 5–8 mm diam. *Hypanthium* 5-angled, often 5-ribbed, 1.5–2 mm long; free portion up to 0.5 mm long. *Sepals* 0.4–0.6 mm long, largely herbaceous, ridged, \pm entire. *Petals* 2.5–4 mm long, white or pale pink. *Stamens* 7–10, opposite the petals and some or all of the sepals. *Antipetalous filaments* 0.5–0.8 mm long. *Anthers* (including gland) c. 0.4 mm long; connective gland 0.2–0.3 mm long. *Ovules* 5–7. *Style* 0.7–1.3 mm long. *Fruits* 1.5–2.1 mm long, c. 1.5 mm diam.; seed \pm broadly obovoid (somewhat flattened on side adjacent to placenta), 1–1.4 mm long, c. 0.8 mm wide, testa medium brown, hilum c. 0.2 mm diam.

Diagnostic features. Distinguished from other species by the following combination of characters: obovate or broadly obovate leaves that are somewhat keeled, 1–3-flowered peduncles usually 0.4–1.5 mm long, persistent bracteoles, 5-angled hypanthium, 7–10 stamens, which are antipetalous and antisealous, petals 2.5–4 mm long, ovules 5–7 and style 0.7–1.3 mm long.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 8 Oct. 1998, *P. Armstrong s.n.* (PERTH); 20 Oct. 1974, *J.S. Beard* 7113 (PERTH); 7 Oct. 1989, *D. Bellairs* 1654 A (PERTH); 7 Nov. 2003, *R. Meissner* NA_R 254 (PERTH); 29 Aug. 1985, *C.I. Stacey* 772 (PERTH).

Distribution and habitat. Extends from near Nerren Nerren Station south to near Ajana, with atypical specimens further south near Greenough River and Mullewa (Figure 2B). Recorded on yellow sand or red, rocky soil.

Phenology. Flowers August to October. Mature fruits recorded in October and November.

Conservation status. Previously listed by Jones (2015) as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora as *M. sp.* Hardabutt Rapids (D. Bellairs 1654A). It was recently downgraded to Priority Three.

Etymology. From the Greek *penta-* (five-) and *gonus* (angled), referring to the five-angled hypanthium (i.e. with a pentagonal shape in transverse section). This shape is obvious both in flower and fruit.

Affinities. Very similar to *M. roseus*, but that species differs in having more oblong leaves, which are not keeled, and a more wrinkled young hypanthium, which becomes enlarged and very smooth in fruit. *Malleostemon roseus* also has longer peduncles on average. In *M. pentagonus*, the young hypanthium is usually shorter than in *M. roseus* and is dotted with oil glands but otherwise smooth between the antisepalous ribs; it scarcely enlarges in fruit.

Co-occurring species. One specimen (*R. Meissner* NA_R 254) was recorded growing with two other species of *Malleostemon*, in *M. 'roseus* (form 1) *R. Meissner* 255 shrubland' over *M. peltiger*.

Notes. One of the *M. pentagonus* specimens, *J.S. Beard* 7113, was identified as *M. roseus* by Green (determinavit dated 18 January 1982) but he probably did not examine any other specimens of this new species. The anthers of *M. roseus*, are reported to be uni-locular (Green 1983) so the anther morphology of *M. pentagonus* needs to be examined to see whether it too has uni-locular anthers.

An atypical specimen from near Greenough River (*P. Armstrong s.n.* PERTH 05372380) differs from the above description in having more or less sessile flowers. Trudgen has suggested (on determinavit dated 13 June 2012) that two other atypical specimens may either be hybrids with *M. roseus*, or a new species. Those specimens, *C.I. Stacey* 795 and *P.G. Wilson* 1528, were possibly collected from the same location west of Mullewa. They are atypical in having only five or six stamens per flower (usually five opposite the petals), and secondary axes up to 0.5 mm long.

Malleostemon pustulatus* Rye, *sp. nov.

Typus: Kalbarri National Park, Western Australia [precise locality withheld for conservation reasons], 25 September 2002, *M.E Trudgen* 21702 (*holo:* PERTH 06360572; *iso:* CANB, MEL, K).

Malleostemon sp. Junga Dam (D. Bellairs 942), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Shrub 0.5–1.5 m high, commonly 0.5–1 m wide; flowering branchlets with 1–10 pairs of flowers. *Young stems* somewhat 4-angled or 4-ribbed. *Leaves* antrorse or appressed, not clustered. *Foliar colleters* up to 0.5 mm long. *Petioles* absent or up to *c.* 0.1 mm long. *Leaf blades* ± oblong in outline, 1.3–2 mm long, 0.4–0.7 mm wide, 0.3–0.5 mm thick; margins entire, with a row of 3–5 large glands on each side of the midvein and also scattered smaller glands; apical point absent. *Peduncles* 1.2–1.8 mm long, 1-flowered. *Bracteoles* caducous or deciduous, 0.4–0.6 mm long, ± entire; keel prominent, often reddish; scarious margins narrow. *Pedicels* ± absent. *Flowers* 2.5–3.5 mm diam. *Hypanthium* glandular-rugose (pustulate), 5-ribbed in top half, 1–1.3 mm long; free portion *c.* 0.3 mm long. *Sepals* 0.3–0.5 mm long, largely herbaceous, strongly incurved in fruit. *Petals* 1.2–1.5 mm long, white or pale pink. *Stamens* 5, antisepalous, 1 opposite each sepal. *Filaments* 0.2–0.3 mm long. *Anthers* (including gland) 0.2–0.25 mm long; connective gland 0.1–0.15 mm long. *Ovules* 4–6. *Style* *c.* 0.3 mm long. *Fruits* 1.3–1.6 mm long, *c.* 0.8 mm diam., not seen at maturity.

Diagnostic features. Differs from most species in having 5, antisepalous stamens, and from the remaining species in having leaves that are neither clustered nor pointed. Other important characters:

1-flowered peduncles 1.2–1.8 mm long, caducous or deciduous bracteoles 0.4–0.6 mm long, petals 1.2–1.5 mm long, 4–6 ovules and style *c.* 0.3 mm long.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 21 Sep. 2001, *D. & B. Bellairs* 6207 (PERTH); 3 Oct. 2007, *A. Crawford* 1388 (PERTH); 16 Sep. 1987, *J.W. Green* 5426 (PERTH); 22 Sep. 1994, *A.G. Gunness* 2384 B (AD, BRI, PERTH); 24 Oct. 2008, *L.S.J. Sweedman* 7506 (PERTH).

Distribution and habitat. Occurs in Kalbarri National Park (Figure 2A), on low-lying sandy ground. One collector recorded the species as ‘scattered amongst other species but also occurring in almost monospecific thickets’.

Phenology. Flowers in September and October.

Etymology. The epithet is Latin and means having pustules. It refers to the surface of the hypanthium.

Conservation status. Recently listed as Priority Two under Department of Parks and Wildlife Conservation Codes for Western Australian Flora as *M. sp.* Junga Dam (*D. Bellairs* 942). The species appears to be highly restricted but is locally abundant.

Affinities. This distinctive species was confused with *M. sp.* Moonyoonooka, which differs in having a truncate base to the hypanthium, longer bracteoles, a variable number of stamens per flower but a constant ovule number of four, and a transversely reniform seed. In *M. pustulatus* the hypanthium is tapered at the base, and the stamen number is constant whereas the ovule number per flower is variable.

Malleostemon pustulatus is similar to *M. decipiens* (W.Fitzg.) Trudgen and *M. tuberculatus* in having five, equidistant antisepalous stamens. However, *M. decipiens* differs from *M. pustulatus* in its densely clustered leaves and longer bracteoles, sepals and petals, while *M. tuberculatus* differs in its more prominently pointed leaves, fruits with persistent spreading petals and more numerous ovules. Both differ in the ornamentation on the hypanthium, with *M. decipiens* having longer ribs and not being pustulate on the hypanthium, while *M. tuberculatus* has a more rugose hypanthium.

Co-occurring species. Although several other *Malleostemon* species occur in Kalbarri National Park, none has been recorded growing with *M. pustulatus*.

Notes. The first collection of *M. pustulatus* was made in September 1987 (*J.W. Green* 5426), making it the most recently discovered of the species described here. It was initially misidentified as *M. roseus*. *Malleostemon pustulatus* has the smallest bracteoles in the genus; they are shed early, well before the flowers open. Foliar colleters are unusually large in this species, although still minute in comparison with the leaf size.

Although no mature seeds have been examined, the cavity within the fruit is obovoid or possibly more cylindrical in shape, so the seed would clearly be longer than broad as indicated in the key to species.

Malleostemon uniflorus Rye, *sp. nov.*

Typus: Binu East Road, 11.6 km east of North West Coastal Highway, Western Australia, 19 August 2003, M.E. Trudgen & B.L. Rye MET 22040 (*holo*: PERTH 08212651; *iso*: CANB, K, MEL, NSW).

Malleostemon sp. Ajana (M.E. Trudgen 21715), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 30 October 2015].

Shrub 0.7–3 m high, up to 3 m wide; flowering branchlets with up to 7 (usually 2–5) pairs of flowers. *Young stems* dark, reddish, ridged below each leaf, soon becoming smooth and grey. *Leaves* antrorse or widely spreading, commonly crowded on the branchlets. *Foliar colleters* up to 0.3 mm long. *Petioles* well defined, mostly 0.2–0.5 mm long. *Leaf blades* very broadly or depressed-obovate, 1.5–2.5 mm long, 1.5–2.2 mm wide, margins entire, outer surface with 2–4 main rows or oil glands on each side of the midvein, the row closest to the centre with 3–4 glands, inner surface concave and with oil glands much less obvious; apical point absent or up to 0.15 mm long. *Peduncles* ± absent, 1-flowered. *Bracteoles* persistent, 2.5–3.5 mm long, with scarious margins ± entire. *Pedicels* ± absent. *Flowers* 6–8 mm diam. *Hypanthium* usually 5-ribbed, 1.3–1.7 mm long; free portion 0.5–0.6 mm long. *Sepals* 0.6–1 mm long, widely spreading in fruit, with a green herbaceous keel and hyaline margins, ± entire; hyaline margins broad, up to *c.* 0.5 mm across. *Petals* 2.5–3.5 mm long, white or pale pink. *Stamens* 5–10, opposite the petals and often opposite some or all of the sepals. *Antipetalous filaments* 0.5–0.7 mm long. *Anthers* (including gland) 0.35–0.4 mm long; connective gland 0.2–0.25 mm long. *Ovules* 4–6. *Style* 0.6–1.3 mm long. *Fruits* *c.* 1.5 mm long (excluding attached parts), 1.2–1.3 mm diam.; seed (not seen fully mature), developing in an irregularly obovoid or broadly obovoid cavity *c.* 1.3 mm long.

Diagnostic features. Distinguished primarily by having bracteoles 2.5–3.5 mm long and 4–6 ovules. Other important characters are its 1-flowered axils, ± absent peduncles, 5–10 stamens, which are all antipetalous or also antisepalous, petals 2.5–3.5 mm long and style 0.6–1.3 mm long.

Selected specimens examined. WESTERN AUSTRALIA: S of Coolcalalaya Station, W side of Gas Pipeline, 0.6 km N of vermin proof fence, 6 Sep. 1990, A.H. Burbidge 4527 (PERTH); shire area by golf course, Mullewa, 10 Sep. 2003, J. Docherty 180 (PERTH); 9 miles [14.5 km] N of Murchison River Bridge, 6 Sep. 1966, A.S. George 7881 (PERTH); 29 miles [47 km] N of Northampton, 28 Aug. 1965, K.R. Newbey 2199 (PERTH).

Distribution and habitat. Extends from Nerren Nerren Station south-east to Mullewa (Figure 3), on red or yellow sand.

Phenology. Flowers from July to October, mainly during August and September. Almost mature fruits recorded in September.

Etymology. The epithet is Latin and has been chosen since this is one of the few members of the genus that have only one flower per peduncle. Most species of *Malleostemon* have varied numbers of flowers per peduncle, up to at least seven flowers.

Conservation status. Not considered to be at risk.

Affinities. Previously included within *M. minilyaensis*, which differs in having bracteoles 1.2–2(–2.2) mm long, up to nine ovules, and in having a more or less constant stamen number of ten, rather than varying

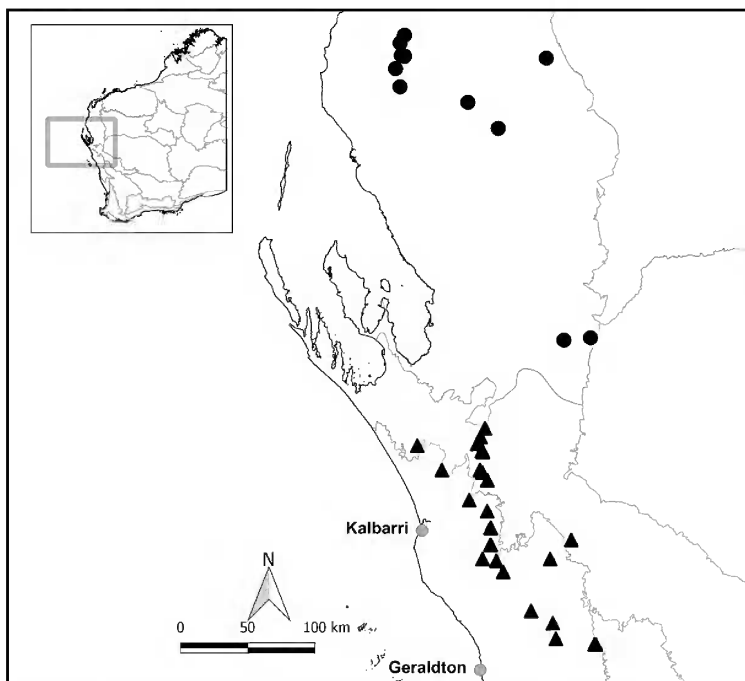


Figure 3. Distribution of *Malleostemon minilyaensis* (●) and *M. uniflorus* (▲).

from five to ten. It also tends to have broader leaves, longer stamens and a longer style. The two taxa are geographically separated (Figure 3), with the southernmost localities of *M. minilyaensis* inland and north-east of the northernmost localities of *M. uniflorus*.

Co-occurring species. Recorded growing with both *M. roseus* and *M. peltiger* at a location south of Billabong Roadhouse.

Notes. About half of the specimens cited by Green (1983) for *M. minilyaensis* are of *M. uniflorus*, and the description provided matches the latter in giving the bracteole length as 3 mm, although it fits *M. minilyaensis* more accurately with respect to stamen and ovule numbers.

Although *M. uniflorus* is known from many collections, its description is still incomplete owing to the lack of fruiting material with mature seeds.

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